REMARKS/ARGUMENTS

Not having yet received an Advisory Action from the Examiner responsive to the December 28, 2007 submission (concurrent with a Notice of Appeal), the undersigned has had an opportunity now to further consult with the inventors and thus presents supplemental remarks for the Examiner's consideration prior to appeal.

Examiner Wimer is thanked for a helpful telephone interview on February 27, 2008 with the undersigned, inventor Michael Van Blaricum and assignee Toyon's inhouse registered agent Kenan Ezal. The following remarks include a summary of arguments presented during that interview.

Consistent with the following remarks, the earlier request for the Examiner to provide documented proof of the allegedly "well known relationship" relied upon by the Examiner is hereby withdrawn.

Analytical consideration of the Gothard teaching (as detailed below) has now demonstrated conclusively that the Gothard teaching is actually <u>contrary</u> to the applicant's claimed invention. Accordingly, no teaching or suggestion in Gothard could possibly make "obvious" the applicant's claimed invention.

Gothard states that each element needs to be "somewhat out phase" with the other elements. Out of phase is 180°. So the distance between elements 701-706 needs to be approximately $\lambda/2$ and the area of Gotthard's suggested aperture size in Figure 7 is therefore $\pi\lambda^2/4$. The applicant's claims require an array of "small" elements -- defined in

the claims as having a largest dimension of each radiating aperture less than $\lambda/2$, including all parasitic components. Therefore, applicant's spacing between components of a given single "small element" is less than $\lambda/4$ and applicant's maximum "small element" aperture size is $\pi\lambda^2/16$. That is 25% of the suggested area of the Gothard aperture (for the collection of items 701-706 which the Examiner appears to collectively equate to a single one of applicant's claimed plurality of "small elements").

The Examiner states that "[t]he added language to the half wavelength at the lowest frequency is a well known relationship in order for the low frequencies to be useful in the antenna array. A skilled artisan would have found it obvious to employ such a dimension." The Examiner also states that "a skilled artisan would have found it obvious to provide the radiating aperture the size of the lowest resonant frequency of operation (one half wavelength)."

Consistent with the Examiner's assertions, a skilled artisan would select a distance equal to $\lambda/2$ between the elements of an array and, in fact, Gothard does exactly that for the plural elements 701-706 -- actually defining an array rather than a single element of an array. In fact, there is no teaching or suggestion in Gothard regarding the spacing between the active element 706 and passive elements 701-705 of the array 700 that is counter to common knowledge and accepted practice of skilled artisans.

Gothard states that "[t]he distance between each passive antenna elements 701 through 705 and the active antenna element 706 is great enough so that the phase

relationship between a signal received by more than one element 701 through 706 will be <u>somewhat out of phase</u> with the other elements that also receive the same signal,"(emphasis added). In order for the signals received by two elements to be "somewhat out of phase" they must be separated by a distance of approximately $\lambda / 2$ (or 180°). Certainly, they **must** be separated by ***greater than*** $\lambda / 4$ (or 90°), *otherwise they would be somewhat* ***in phase.***

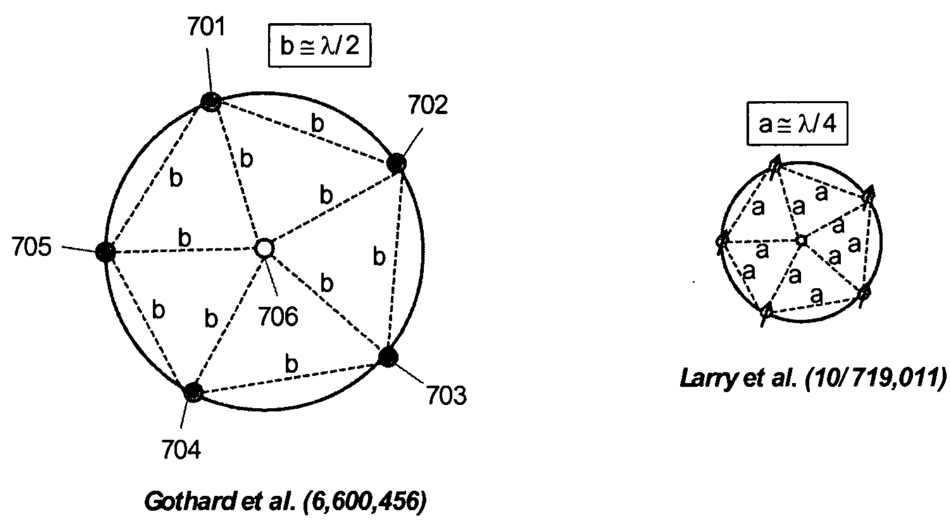

Figure A: Size comparison of Gothard's (6,600,456) entire antenna *<u>array</u>* and applicant's small radiating *<u>element</u>* -- of a larger array

Gothard's antenna *array* (in Fig. 7) is shown to the left in Figure A. Note that the spacing (b) between passive and active elements is approximately $b \approx \lambda / 2$. To be considered "somewhat out of phase," one must have, ***at a minimum*** $b > \lambda / 4$, with $\lambda / 2$ being closer to "out of phase".

In contrast, applicant requires each "small" antenna radiating *element* (of the claimed array of plural such elements) to have a "largest dimension of about one-half

wavelength." Hence, if we assume (for the claimed *element*) the same formation of active and passive elements as Gothard's antenna *array* (shown in Fig. 7), then the spacing (a) between the active and parasitic components of applicant's antenna *element* is ***at most*** $a \approx \lambda / 4$. The relative size of applicant's small antenna *element* is shown to the right in Figure A. Note that the aperture of Gothard's antenna *array* can be as much as ***four times*** the size of applicant's antenna *element*. Specifically, the aperture size (B) of Gothard's antenna *array* is $\frac{\pi}{16}\lambda^2 < B \leq \frac{\pi}{4}\lambda^2$, whereas the aperture size (C) of applicant's antenna *element* is $C \leq \frac{\pi}{16}\lambda^2$.

Clearly, the active and parasitic components of applicant's ***small antenna element*** are spaced in a manner that is ***counter*** to the teachings of Gothard ***and*** a skilled artisan (*as argued by the Examiner*). Therefore, Gothard's *array of elements* cannot be substituted for applicant's *small antenna element*. As shown mathematically above, the two are in fact distinct structures and teach away from each other.

The Examiner also argues that Gothard teaches "an RF antenna array 700 and method thereof, comprising a plurality of antenna elements 701-706 spatially distributed over an array aperture within the confines of the ground plane 710." The Examiner further states that the *elements* (701-706) of Gothard's array are either passive or active. This is true. Specifically, Gothard et al. teaches a system and method to control ***an array of passive and active elements*** where each element of the array is separated from another element by approximately one-half wavelength.

On the other hand, applicant claims a system and method to control ***an array of electrically small elements where each of the small elements has active and parasitic components***. The spacing between active and parasitic components within the aperture of a small element is specified to be less than one quarter of a wavelength (which is counter to the teachings of a skilled artisan and that of Gothard) -- because claim 1 requires each claimed "small" element to have a radiating aperture with a maximum dimension of about one-half wavelength at the lowest operational freqeuncy.

The Examiner has repeatedly understated the importance in the difference between "***an array of electrically small elements where each of the small elements may have active and parasitic components***" vs. "***an array of passive and active elements***."

The phase center of a simple single active or passive element *cannot be changed*. In other words, in Fig.7 of Gothard (and in Figure A above), the phase centers of *each* of the active and passive elements 701-706 are fixed, regardless of the selected impedance. However, the phase center of the entire array is variable based on the selected impedance of the individual elements. Gothard does not make use of this fact, nor does he allude to any possibility of making use of this fact. He does, however, make use of the fact that the antenna pattern of the *entire* array of active and passive elements is controllable by changing impedances of the passive elements within his array.

In contrast, applicant not only can control the pattern of *each* small antenna element, but also can independently control the phase centers of *each* of the small

antenna elements -- because each "element" also includes at least one reactively-controlled parasitic component and at least one active component. This has far reaching implications in electronically scanned array (ESA) technology including the capability to maintain the gain of an array at very low (end fire), elevation angles, which is not possible using Gothard's array of active and passive elements, or any other array in the prior art.

In fact, if the Gothard array is replicated as separate "elements" of an array, the spacing between such arrayed "elements" would be on the order of at least one wavelength (e.g., see Figure A above). As the Examiner will appreciate, this would not provide an acceptable phased array (e.g., consider the resulting grating lobes).

The capability to independently control the pattern (gain, polarity, VSWR, RCS, etc…) and phase centers of each electrically "small" antenna element in a larger array represents a significant technological paradigm shift, and is certainly counter to the current state-of-the art in array technology which assumes an array of uniform antenna element patterns with fixed phase centers.

Accordingly, the Examiner is again respectfully requested to allow this application in light of the above showing. If some further clarifying amendments to the claims are

believed necessary or desirable, it is requested that the undersigned be telephoned from prompt consideration of same.

Respectfully submitted,

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